

What is claimed:

1 1. A method of providing dynamic quality of service (QoS)
2 in an IP network which handles IP packets and being of the type
3 which uses RSVP (Resource Reservation Protocol) aggregation and
4 differentiated services architecture (Diffserv), said Diffserv
5 comprising a Diffserv domain including Border Routers (BR) and
6 Core Routers (CR), said method comprising the steps of:

7 managing dynamic provisioning of QoS in each Diffserv
8 domain by using a bandwidth broker (BB) which communicates using
9 a predetermined protocol, and maintaining/storing RSVP
10 aggregated states by/in the bandwidth broker to the exclusion of
11 Border Routers.

1 2. A method as in claim 1 wherein the step of managing
2 comprises using a BB which obtains resource availability
3 information by communicating only with BRs to the exclusion of
4 Crs, said BB also having an aggregator and deaggregator
5 functionality.

1 3. A method as in claim 2, including the step of using a
2 plurality of types of BBs and causing the BBs to interact by
3 using RSVP aggregation.

1 4. A method as in claim 2, including the step of
2 refreshing a reservation of resources, which reservation has
3 been accomplished during a previous refreshment period, and
4 including the step of not refreshing reserved resources in each
5 Diffserv domain which resources have to be released in a next
6 refreshment period.

1 5. A method as in claim 1 which said BB is capable of
2 using an RSVP aggregation protocol, including the step of
3 managing stored RSVP aggregation states, and selectively
4 resizing an RSVP aggregated state pursuant to a new end to end
5 RSVP request.

1 6. A method as in claim 1 including the step of using
2 Load Control Protocol, and managing, by use of a BR, resource
3 availability and admission control into Core routers and an
4 interior of said Diffserv domain.

1 7. A method in claim 4 including the step of using a BB
2 in combination with BRs managing the step of refreshing
3 reservation of resources.

1 8. A method as in claim 6 wherein the BRs contain a
2 reservation state which stores a total amount of resources which
3 were reserved by the Load Control Protocol .

1 9. A method as in claim 8 wherein a BB comprises a BB
2 Aggregator and including updating the reservation state if the
3 BB Aggregator is requesting modification or if resource
4 conditions in the Diffserv network including core routers,
5 suddenly change.

1 10. A method as in claim 1 which additionally uses
2 integrated services architecture (Intserv), including the step
3 of achieving interoperability between Intserv and Diffserv by
4 using an edge router.

1 11. A method as in claim 1 which additionally uses
2 integrated service architecture (Intserv), including the step of
3 achieving interoperability between Intserv and Diffserv by using
4 a Bandwidth Broker Deaggregator.

1 12. A method as in claim 1 including the step of using
2 Common Open Policy Services (COPS) protocol as the predetermined
3 protocol for direct communication by the BB.

1 13. A method as in claim 1 including the step of using
2 Simple Network Management Protocol (SNMP) as the predetermined
3 protocol for direct communication by the BB.

1 14. In an IP network of the type which handles IP packets
2 and uses Resource Reservation Protocol (RSVP) aggregation and
3 differentiated services architecture (Diffserv), said Diffserv
4 comprising a Diffserv domain including Border Routers (BR) and
5 Core Routers (CR), a method of providing end to end quality of
6 service (QoS) on demand, comprising the steps of: managing
7 dynamic provisioning of QoS in each Diffserv domain by using
8 a bandwidth broker (BB) which communicates using a predetermined
9 protocol; and storing RSVP aggregated states in said bandwidth
10 broker.

1 15. A method as in claim 1 wherein the step of managing
2 comprises using a BB which obtains resource availability
3 information by communicating only with BRs to the exclusion of
4 CRs.

1 16. A method as in claim 15, including the step of using
2 a plurality of types of BBs and causing BBs to interact by using
3 RSVP aggregation.

1 17 A method as in claim 15, including the step of
2 refreshing a reservation of resources, which reservation has
3 been accomplished during a previous refreshment period.

1 18. A method as in claim 14 wherein said BB is capable of
2 using an RSVP aggregation protocol, including the step of
3 managing stored RSVP aggregation states.

1 19. A method as in claim 14 including the step of a border
2 router using Load Control Protocol and its successors, and
3 managing, by use of a BR, resource availability and admission
4 control into core routers and an interior of said Diffserv
5 domain.

1 20. A method as in claim 14 which additionally uses
2 integrated service architecture (Intserv), including the step of
3 achieving interoperability between Intserv and Diffserv by using
4 an edge router, and a border router informing the BB about
5 resources that are reserved by a Load Control Protocol and its
6 successors.

1 21. A method as in claim 14 which additionally uses
2 integrated service architecture (Intserv), including the step of

3 achieving interoperability between Intserv and Diffserv by using
4 a Bandwidth Broker Deaggregator.

1 22. A method as in claim 14` including the step of using
2 Common Open Policy Service (COPS) protocol as the predetermined
3 protocol for direct communication by the BB.

1 23. A method as in claim 14 including the step of using
2 Simple Network Management Protocol (SNMP) as the predetermined
3 protocol for direct communication by the BB.

1 24. A bandwidth broker which operates using the method of
2 claim 1.

1 25. A bandwidth broker which operates using the method of
2 claim 11.

1 26. A bandwidth broker aggregator which operates using the
2 method of claim 1.

1 27. A bandwidth broker aggregator which operates using the
2 method of claim 11.

1 28. A bandwidth broker deaggregator which operates using
2 the method of claim 1.

1 29. A bandwidth broker deaggregator which operates using
2 the method of claim 11.

1 30. A border router which operates using the method of
2 claim 1.

1 31. A border router which operates using the method of
2 claim 11.

1 32. A core router which operates using the method of
2 claim 1.

1 33. A core router which operates using the method of
2 claim 11.

1 34. A differential services architecture which comprises
2 one of a band width broker aggregator, a band width broker
3 deaggregator, a border router, and a core router, operating
4 using the method of claim 1.

1 35. A differential services architecture which comprises
2 one of a band width broker aggregator, a band width broker
3 deaggregator, a border router, and a core router, operating
4 using the method of claim 11.

1 36. A network subsystem for providing dynamic quality of
2 service (QoS) in an IP network which handles IP packets, the
3 network using Resource Reservation Protocol (RSVP) aggregation
4 and differentiated services architecture (Diffserv) including at
5 least one Diffserv domain including Border Routers(BR) and Core
6 Routers(CR), said network subsystem comprising a bandwidth
7 broker (BB) which manages dynamic provisioning of QoS in each
8 Diffserv domain, using a predetermined protocol, said bandwidth
9 broker including stored RSVP aggregated states.

1 37. A network subsystem as in claim 36 wherein the
2 Diffserv domain includes Border Routers (BRs) and Core Routers
3 (CRs), and wherein the BB obtains resource availability
4 information by communicating with BRs.

1 38. A network subsystem as in claim 37, comprising a
2 plurality of BBs including Bandwidth Broker Aggregators and
3 Bandwidth Broker Deaggregators controlling RSVP aggregation.

1 39. A network subsystem as in claim 37 wherein the BB
2 refreshes an already made reservation of resources which
3 reservation has been accomplished during a previous refreshment
4 period.

1 40. A network subsystem as in claim 36 wherein the BB is
2 capable of using an RSVP aggregation protocol and is able to
3 manage RSVP aggregation states.

1 41. A network subsystem as in claim 36, wherein a border
2 router is capable of using Load Control Protocol, and wherein a
3 BR enables managing resource availability and admission control
4 into core routers and an interior of said Diffserv domain.

1 42. A network subsystem as in claim 36 wherein the
2 predetermined protocol comprises common open policy service
3 (COPS) protocol for direct communication by the BB.

1 43. A network subsystem as in claim 36 wherein the
2 predetermined protocol comprises Simple Network Management
3 Protocol (SNMP) for direct communication by the BB.

1 44. A network subsystem for providing dynamically and on
2 demand end to end Quality of Service (QoS) in an IP network, the

3 network using Resource Reservation Protocol (RSVP) aggregation
4 and differentiated services architecture (Diffserv) having at
5 least one Diffserv domain and including Border Routers (BRs) and
6 Core Routers (CRs) as specified in claim 1, comprising: a
7 bandwidth broker (BB) which manages dynamic provisioning of QoS
8 in each Diffserv domain, using a predetermined protocol, said BB
9 querying only BRs to the exclusion of CRs.

1 45. A network subsystem as in claim 44 wherein the BB
2 refreshes an already made reservation of resources which
3 reservation has been accomplished during a previous refreshment
4 period.

1 46. A network subsystem as in claim 44 wherein the BB is
2 capable of using an RSVP aggregation protocol and is able to
3 store and manage RSVP aggregation states.

1 47. A network subsystem as in claim 44, which is capable
2 of using Load Control Protocol and wherein a BR enables managing
3 resource availability and admission control into an interior of
4 said Diffserv domain.

1 48. A network subsystem as in claim 44 wherein the
2 predetermined protocol comprises common open policy service
3 (COPS) protocol for direct communication by the BB.

1 49. A network subsystem as in claim 44 wherein the
2 predetermined protocol comprises Simple Network Management
3 Protocol (SNMP) for direct communication by the BB.

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